UNITED NATIONS

Framework Convention on Climate Change

Distr.
GENERAL

FCCC/CP/1998/INF.9
2 November 1998

ENGLISH ONLY

CONFERENCE OF THE PARTIES
Fourth session
Buenos Aires, 2-13 November 1998
Item 4 (a) (i) of the provisional agenda

# REVIEW OF THE IMPLEMENTATION OF COMMITMENTS AND OF OTHER PROVISIONS OF THE CONVENTION

## REVIEW OF INFORMATION COMMUNICATED UNDER ARTICLE 12

## NATIONAL COMMUNICATIONS FROM PARTIES INCLUDED IN ANNEX I TO THE CONVENTION

## Summary compilation of annual greenhouse gas emissions inventory data from Annex I Parties

## Note by the secretariat

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# I. INTRODUCTION

## A. Mandate

1. The Conference of the Parties (COP), at its third session, requested the secretariat to collect, process and publish, on a regular basis, national greenhouse gas inventories submitted annually by Annex I Parties in accordance with decision 9/CP.2 (decision 6/CP.3). The COP further requested that, in those years when the compilation and synthesis of national communications is prepared, the annual inventory data submitted by Parties be included in that document. As only four Annex I Parties had submitted their national greenhouse gas inventories by 15 April 1998, the secretariat was unable to include this information in the second compilation and synthesis of second national communications (FCCC/CP/1998/11 and Add.1 and 2).

2. The Subsidiary Body for Implementation (SBI), at its eighth session in June 1998, urged Annex I Parties that had not already done so, to submit their annual national greenhouse gas (GHG) inventories, as soon as possible (FCCC/SBI/1998/6). The SBI further noted that the secretariat would provide a summary report to the SBI at its ninth session, in English only, based on national greenhouse gas inventories submitted by 30 September 1998.

## B. Scope of the note

3. The present note is a summary compilation of the data on greenhouse gas emissions and removals for the period 1990 to 1996, as provided by 21 Annex I Parties in their annual national greenhouse gas inventories received by 15 October 1998. Due to the late submission of many of the inventories the present note provides an overview of the information and a full report will be prepared for the tenth session of the subsidiary bodies. In addition to providing the data in tabular format on greenhouse gas emissions and removals, this note highlights key trends and also considers the manner in which the information was reported, including issues such as timing of submissions, reporting formats used and completeness, consistency and comparability of the data.

## C. Possible action by the SBI

4. The SBI may wish to consider this note with a view to assessing the process of reporting of greenhouse gas inventories. In view of the recurring delay by Parties in submitting national greenhouse gas inventories and the need to have complete, consistent and comparable results, the SBI may wish to recommend that the COP:

(a) Consider revising the date of submission of national inventory data on emissions by sources and removals by sinks on an annual basis from 15 April to 15 October, and request Parties, if possible, to submit data up to the year preceding the year of submission;

(b) Request Parties to provide the information electronically, as well as in printed form.

5. The SBI may wish to note the secretariat's intention to provide a report on the information contained in national inventory submissions for the tenth session of the subsidiary bodies. Noting the issues raised in this paper, and decision 6/CP.3, the SBI may further wish to request the secretariat to include in that report comparisons of the information with authoritative sources, as proposed in document FCCC/CP/1998/5.

6. The SBI may also wish to invite the Subsidiary Body for Scientific and Technological Advice (SBSTA) to take into account the issues raised in this paper as related to its ongoing methodological work on GHG inventories regarding the guidelines for the preparation of communications by Parties included in Annex I to the Convention. In particular the SBI may wish to invite SBSTA to provide clear guidance on how to report revisions to previously submitted inventory data and, in light of any possible revisions, the years for which inventories should be provided in annual submissions.

## II. REPORTING ISSUES

### A. Timing of submissions

7. Only four Parties submitted their national GHG inventories for the period 1990 to 1996 by the due date, 15 April 1998, and 17 more Parties submitted the information by 15 October 1998 (see box 1).

**Box 1. Timing of submissions**

| Timing | Party |
|---|---|
| by 15 April 1998 | Ireland, Netherlands, Switzerland, United Kingdom |
| by 15 May 1998 | Austria, Czech Republic, Germany, New Zealand, Norway, Sweden |
| by 15 October 1998 | Australia, Belgium, Canada, Denmark, France, Greece, Japan, Latvia, Monaco, Slovakia, United States |

8. Some Parties submitted information in draft or preliminary form, or in parts, or submitted subsequent revisions to their inventories.

## B. Completeness, consistency and comparability of data

9. The completeness of national GHG inventories has varied among Parties. Only 14 of the 21 reporting Parties provided data for the years 1990 to 1996, two Parties for 1995 and 1996,[1] and five Parties for 1996 only[2].

10. All Parties submitted information in accordance with the reporting format of the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National GHG Inventories, although not for all years for which they reported, and some Parties used category classifications from earlier IPCC Guidelines.

11. Some Parties did not provide estimates for all gases or disaggregate information for all source categories. In a few cases the information was not complete for the entire period of years for which the Party reported.

12. The Guidelines request Parties to provide supplementary information to ensure adequate transparency. Of the 21 reporting Parties, 13 provided some information on emission factors and activity data used[3]. However, this information was not provided for all gases, source categories or years by the reporting Parties.

13. A particular problem was the reporting of information on hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride ($SF_6$). Although 12 of the 16 Parties that reported information on one or more of these gases indicated whether reported emissions were actual or potential, seven Parties reported aggregate emissions for these gases and not by individual gas species, or reported emissions in carbon dioxide ($CO_2$) equivalent only[4]. For those Parties that provided aggregate emissions, the secretariat had to make assumptions as to the specific species of the gases when converting emissions to $CO_2$ equivalent (see table 6).

14. Fourteen of the 21 reporting Parties provided information in electronic format, although not all followed the IPCC reporting format completely. Provision of GHG inventories electronically in the IPCC format facilitates the processing and dissemination of this information.

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1 Ireland and Slovakia.

2 Czech Republic, Denmark, Latvia, Sweden and Switzerland.

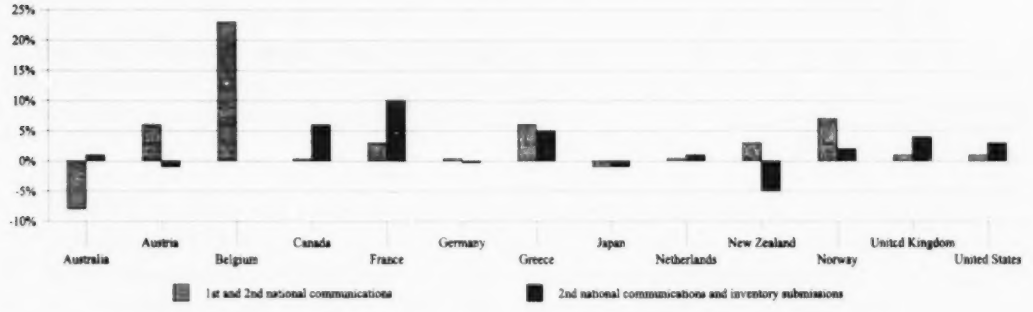
3 The following Parties did not provide information on activity data and emission factors in their annual inventory submission: Belgium, Czech Republic, Denmark, Ireland, Latvia, Netherlands and Norway.

4 Austria, Canada, Czech Republic, Denmark, Germany, Greece and Japan.

## C. Changes in the 1990 inventory

15. Except for Belgium, all Parties that reported emissions for 1990 revised their estimates from earlier submissions. The change in aggregate emissions of $CO_2$, methane ($CH_4$) and nitrous oxide ($N_2O$) from second national communications ranged from 6 per cent lower to 10 per cent higher (see figure 1 and box 2)[5]. The inclusion of sources previously not considered was the most frequent reason for revisions; in particular, for several Parties, revisions were due to $N_2O$ emissions from agriculture in accordance with the IPCC Guidelines (manure management and agricultural soils). However, use of revised activity data and emission factors was also noted. Only 10 Parties provided some explanation for the revisions to earlier estimates[6].

**Figure 1. Changes in 1990 GHG emission inventories between first and second national communications and most recent inventory submissions**




**Box 2. Changes in 1990 GHG emission inventories between second national communications (1995) and most recent inventory submissions**

| | Aggregate GHG ($CO_2$, $CH_4$, $N_2O$) | $CO_2$ | $CH_4$ | $N_2O$ |
|---|---|---|---|---|
| Australia | 1 | 1 | 4 | -5 |
| Austria | -1 | 0 | 0 | -21 |
| Belgium | 0 | 0 | 0 | 0 |
| Canada | 6 | -1 | 3 | 121 |
| France | 10 | 3 | 0 | 70 |
| Germany | 0 | 0 | -3 | 0 |
| Greece | 5 | 1 | -1 | 73 |
| Japan | -1 | 0 | -2 | -42 |
| Netherlands | 1 | -4 | 17 | 25 |
| New Zealand | -6 | -1 | -2 | -22 |
| Norway | 2 | 0 | 2 | 20 |
| United Kingdom | 4 | 0 | -1 | 79 |
| United States | 3 | 0 | 0 | 159 |

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5 The changes in 1990 estimates for Monaco are not given in figure 1 or box 2 since the earlier inventories were incomplete. For purposes of consistency and comparability, emissions of HFCs, PFCs and $SF_6$, and emissions/removals from land-use change and forestry are not considered in figure 1 or box 2.

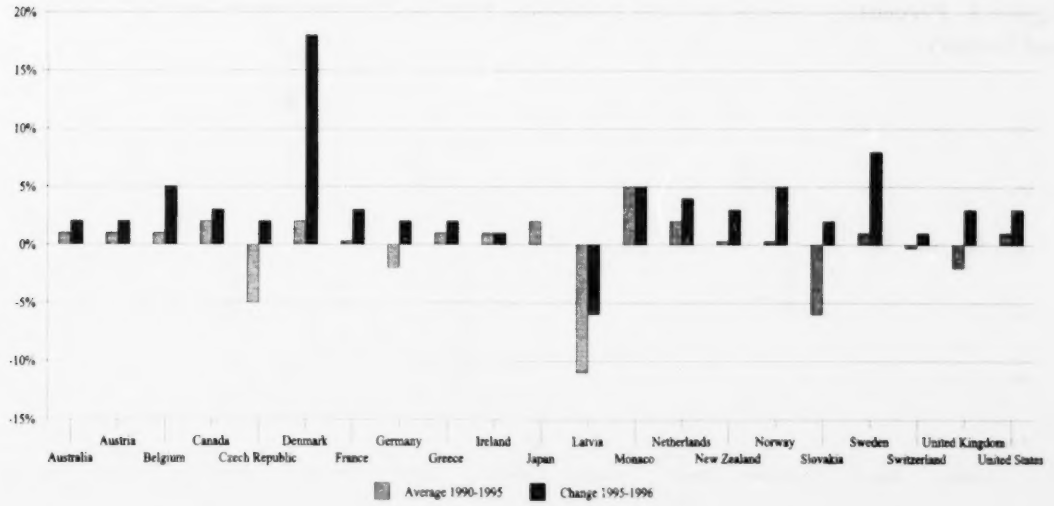
6 Australia, Austria, Canada, France, Greece, Netherlands, New Zealand, Norway, United Kingdom and United States.

16. Six Parties[7] revised earlier estimates of emissions and removals from land-use change and forestry, although explanations were not provided by all; revision of activity data or inclusion of additional sources or sinks were the main underlying causes. Australia and the United States reported the largest changes in estimates for land-use change and forestry, 32 per cent lower and 149 per cent higher, respectively. In the case of Australia this was due to revised estimates of emissions from land clearing and for the United States on account of inclusion of forest floor and soil carbon fluxes and inclusion of estimates related to harvests from public timberland which had previously not been considered.

## III. EMISSION TRENDS, 1995-1996

17. Aggregate emissions have risen for all reporting Parties, except Latvia, from 1995 to 1996. The increasing trend in emission with the exclusion of land-use change and forestry is similar. The increase in aggregate emissions for 1995 to 1996 has been larger than the average annual increase in emissions over the period 1990-1995 (see figure 2).[8]

**Figure 2. Annual average percentage change in GHG emissions (excluding land-use change and forestry) from 1990 to 1995 and percentage change from 1995 to 1996**

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7 Australia, France, Japan, New Zealand, United Kingdom and United States.

8 The percentage change from 1995 to 1996 for the Czech Republic, Denmark, Latvia, Sweden and Switzerland may not be fully representative as these Parties submitted data only for 1996 and in order to present percentage change over time, data for 1990-1995 previously submitted in national communications or GHG inventories were used for the calculations.

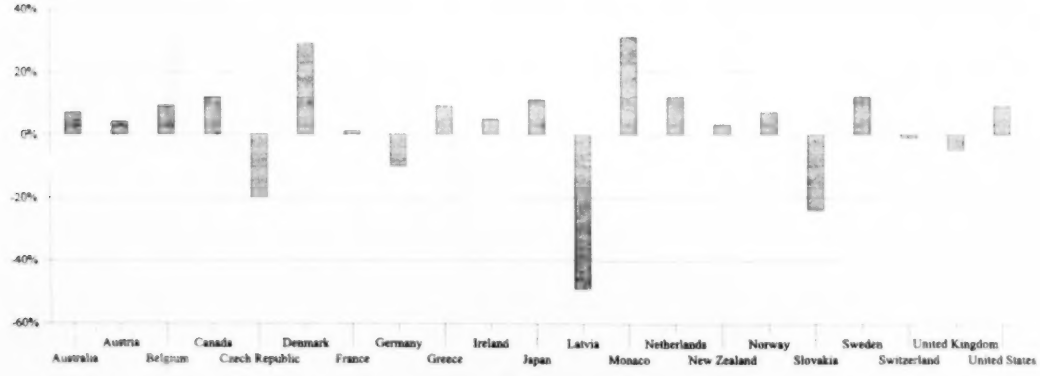
18. One of the larger sources of emissions, and the fastest growing, is transport. Emissions from transport ($CO_2$ and $N_2O$) increased from 1995 to 1996 for all Parties except four (Latvia, Monaco, Slovakia and Sweden).

19. Emissions of $CO_2$ increased for all Parties, except Latvia, from 1995 to 1996. Emissions of $N_2O$ increased, except for Australia, Austria, Ireland, Latvia, New Zealand and Switzerland, where they decreased slightly or remained stable. Emissions of $CH_4$ continued to decrease or remained stable.

## IV. GREENHOUSE GAS EMISSIONS AND REMOVALS, 1990-1996

20. There is a rising trend in aggregate GHG emissions (excluding the land-use change and forestry sector) for 15 of the reporting Parties from 1990 to 1996, the increases ranging from 3 to 31 per cent over the period (see figure 3 and table 1); five Parties (Czech Republic, Germany, Latvia, Slovakia, United Kingdom), representing approximately 13 per cent of aggregate GHG emissions from Annex I Parties, indicate a decline in emissions. There was no discernible trend in emissions for France and Switzerland, with emissions fluctuating either slightly above or below 1990 levels over the period.

**Figure 3. Percentage change in GHG emissions, 1990 to 1996, excluding land-use change and forestry**




21. The trend in aggregate GHG emissions with the inclusion of $CO_2$ emissions and removals from land-use change and forestry was similar, although the increase was notably smaller for some Parties (see table 2). For 8 of the 17 Parties that reported estimates from land-use change and forestry for the period 1990 to 1996, aggregate GHG emissions rose, the increases ranging from 2 to 19 per cent above 1990 levels; for six Parties emissions were lower and for Switzerland and France emissions were relatively stable over the period.

22. $CO_2$ emissions displayed a trend similar to that of aggregate GHG emissions. For 15 Parties $CO_2$ emissions increased from 1990 to 1996; for five Parties they decreased and for Switzerland they remained around levels of 1990. The most important category of $CO_2$ emissions was non-transport energy-related emissions, for most Parties constituting more than 70 per cent of $CO_2$ emissions in 1996 (see table 8). Emissions from transport were the second largest source of $CO_2$ emissions for most Parties, and for all Parties, except Latvia and Slovakia, emissions from transport increased from 1990 to 1996.

23. Information on $CO_2$ emissions and removals from the land-use change and forestry sector were reported by 19 of 21 Parties (see table 7) . For all but two reporting Parties (Australia and the United Kingdom) this sector constitutes a net sink. As well, for most Parties, the size of their sink increased over the period 1990 to 1996, and in the case of Australia and the United Kingdom, their net emissions from this sector decreased over the period. Canada, New Zealand, Sweden and the United States reported a decline in the size of their sink from 1990 to 1996.

24. Thirteen Parties' total $CH_4$ emissions showed a declining trend over the period 1990 to 1996 , six Parties indicated a rise in emissions over the period and for two Parties emissions fluctuated slightly above or below 1990 levels (see table 4). For 1996 the largest source of $CH_4$ emissions for 11 of the Parties was agriculture, contributing between 40 and 90 per cent of total $CH_4$ emissions. Emissions from waste and fugitive fuel were the largest source of emissions for six and three Parties, respectively (see table 9).

25. Eleven Parties indicated a rising trend in total $N_2O$ emissions over the period 1990 to 1996, six Parties indicated a decline in emissions over the period and for four Parties emissions fluctuated slightly above or below 1990 levels (see table 5). The largest source of $N_2O$ emissions in 1996 for all Parties except five was agriculture, contributing between 33 and 97 per cent of total $N_2O$ emissions. For only three Parties were emissions from industrial processes the largest source of $N_2O$ emissions, and for two Parties energy-related emissions were the largest source (see table 10).

26. The information reported on HFCs, PFCs and $SF_6$ indicates an increase in emissions for most Parties, except for PFCs, where some Parties reported a decline in emissions over the period 1990 to 1996 (see table 6). Data submitted on HFCs, PFCs and $SF_6$ were less consistent than for other gases; although 17 of 21 Parties reported information on at least one of these gases, data were not always provided for all years. In six cases, since information was provided in full mass of the gases without a disaggregation by species, the secretariat had to make certain assumptions as to the species of the gases in order to calculate $CO_2$ equivalents.

## V. TABLES OF GREENHOUSE GAS EMISSIONS AND REMOVALS

27. Inventory data for the years 1990-1996 for individual Annex I Parties are presented in tables 1 to 10. Tables 3 to 5 contain information on the level of total emissions of the main GHGs , carbon dioxide, excluding the land-use change and forestry sector, methane and nitrous oxide, for 1990, 1995 and 1996 in mass units, the change in these emissions over the period 1991-1996 expressed in percentage relative to 1990, and the change in emissions from 1995 to 1996 expressed in percentage relative to 1995. Table 1 contains the same information for aggregate emissions of all greenhouse gases combined (expressed as $CO_2$ equivalent), excluding land-use change and forestry, and table 2, including land-use change and forestry. Table 6 provides information on emissions of HFCs, PFCs and $SF_6$ in $CO_2$ equivalent for 1990 and 1996 and table 7 presents data on $CO_2$ emissions and removals from the land-use change and forestry sector, and the change in emissions or removals from 1990 to 1996 expressed in percentage relative to 1990. Tables 8 to 10 provide disaggregated emissions of $CO_2$, $CH_4$ and $N_2O$ by category for the years 1990 and 1996. For seven Parties the estimates given in tables 1 to 5 and 8 to 10 may not be fully accurate as Parties did not provide data for 1990 and all subsequent years, and in order to present the trend in emissions the secretariat used data previously submitted in national communications or GHG inventories. The footnotes to the tables indicate in which instances data from previous submissions were included.

**Table 1. Aggregate emissions of greenhouse gases ($CO_2$ equivalent), 1990-1996, excluding land-use change and forestry (Gigagrams and percentage change by Party)**

| | Percentage relative to 1990, 1990=100 | | | | | | | | | 1996 to 1995 percentage 1995=100 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1995 | 1996 | |
| | (Gg) | % | % | % | % | % | % | (Gg) | (Gg) | % |
| Australia | 415 656 | 100 | 101 | 101 | 102 | 105 | 107 | 435 471 | 445 840 | 102 |
| Austria[a] | 77 271 | 106 | 98 | 97 | 97 | 102 | 104 | 78 830 | 80 152 | 102 |
| Belgium[a] | 138 943 | 103 | 101 | 100 | 104 | 104 | 109 | 145 126 | 151 858 | 105 |
| Canada | 598 099 | 99 | 101 | 103 | 106 | 109 | 112 | 653 570 | 671 374 | 103 |
| Czech Republic[ab] | 192 130 | 92 | 85 | 82 | 78 | 79 | 80 | 150 912 | 153 579 | 102 |
| Denmark[ab] | 71 658 | 115 | 108 | 110 | 115 | 110 | 129 | 78 792 | 92 681 | 118 |
| France | 557 039 | 104 | 102 | 97 | 97 | 98 | 101 | 547 837 | 562 105 | 103 |
| Germany | 1 209 107 | 96 | 92 | 91 | 90 | 89 | 90 | 1 073 748 | 1 091 140 | 102 |
| Greece | 105 235 | 100 | 101 | 102 | 104 | 107 | 109 | 112 189 | 114 789 | 102 |
| Ireland[ac] | 56 861 | 99 | 100 | 100 | 103 | 104 | 105 | 59 324 | 59 722 | 101 |
| Japan[d] | 1 221 707 | 102 | 104 | 103 | 109 | 111 | | 1 352 134 | | |
| Latvia[ab] | 35 669 | 82 | 72 | 62 | 54 | 54 | 51 | 19 196 | 18 064 | 94 |
| Monaco[a] | 111 | 116 | 123 | 125 | 128 | 125 | 131 | 139 | 145 | 105 |
| Netherlands | 217 107 | 103 | 102 | 103 | 104 | 108 | 112 | 234 432 | 243 071 | 104 |
| New Zealand | 72 417 | 100 | 101 | 101 | 100 | 100 | 103 | 72 753 | 74 642 | 103 |
| Norway | 55 064 | 96 | 93 | 97 | 101 | 102 | 107 | 55 984 | 58 903 | 105 |
| Slovakia[ac] | 72 496 | 88 | 81 | 77 | 72 | 75 | 76 | 54 226 | 55 148 | 102 |
| Sweden[ab] | 65 101 | 99 | 101 | 101 | 104 | 103 | 112 | 67 176 | 72 723 | 108 |
| Switzerland[ab] | 53 749 | 103 | 101 | 98 | 97 | 98 | 99 | 52 763 | 53 416 | 101 |
| United Kingdom | 757 851 | 100 | 97 | 94 | 93 | 92 | 95 | 695 301 | 716 818 | 103 |
| United States | 5 999 122 | 99 | 101 | 103 | 105 | 106 | 109 | 6 349 340 | 6 557 050 | 103 |

[a] As estimates for HFCs, PFCs and $SF_6$ were not provided, or not provided for all years, estimates given here are for $CO_2$, $CH_4$ and $N_2O$ only.

[b] As estimates for 1990-1995 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

[c] As estimates for 1990-1994 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

[d] Estimates were only provided for 1990-1995.

**Table 2. Aggregate emissions of greenhouse gases ($CO_2$ equivalent), 1990-1996, including land-use change and forestry[a] (Gigagrams and percentage change by Party)**

| | Percentage relative to 1990, 1990=100 | | | | | | | | | 1996 to 1995 percentage 1995=100 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1995 | 1996 | |
| | (Gg) | % | % | % | % | % | % | (Gg) | (Gg) | % |
| Australia | 474 529 | 99 | 98 | 98 | 97 | 100 | 102 | 472 615 | 482 100 | 102 |
| Austria[b] | 63 971 | 104 | 90 | 89 | 95 | 102 | 104 | 65 230 | 66 352 | 102 |
| Belgium[b] | 136 886 | 103 | 101 | 100 | 104 | 105 | 109 | 143 069 | 149 801 | 105 |
| Canada | 554 099 | 97 | 102 | 106 | 110 | 115 | 116 | 634 570 | 642 374 | 101 |
| Czech Republic[bc] | 189 849 | 91 | 83 | 80 | 77 | 77 | 79 | 145 458 | 149 100 | 103 |
| Denmark[bc] | 70 734 | 115 | 108 | 110 | 115 | 110 | 130 | 77 828 | 91 700 | 118 |
| France | 526 723 | 105 | 102 | 95 | 95 | 97 | 99 | 508 702 | 520 856 | 102 |
| Germany | 1 179 107 | 95 | 91 | 90 | 89 | 88 | 89 | 1 040 048 | 1 055 240 | 101 |
| Greece[d] | | | | | | | | | | |
| Ireland[bc] | 51 701 | 98 | 100 | 99 | 10 | 103 | 103 | 53 094 | 53 225 | 100 |
| Japan[f] | 1 137 804 | 102 | 104 | 102 | 109 | 110 | | 1 255 429 | | |
| Latvia[bc] | 24 843 | 61 | 45 | 32 | 20 | 35 | 15 | 8 712 | 3 744 | 43 |
| Monaco[d] | | | | | | | | | | |
| Netherlands | 215 607 | 103 | 103 | 103 | 104 | 108 | 112 | 232 732 | 241 371 | 104 |
| New Zealand | 51 104 | 102 | 107 | 109 | 110 | 110 | 114 | 56 285 | 58 112 | 103 |
| Norway | 45 474 | 91 | 83 | 87 | 88 | 93 | 91 | 42 344 | 41 292 | 98 |
| Slovakia[bc] | 68 239 | 88 | 80 | 75 | 69 | 72 | 73 | 49 110 | 49 867 | 102 |
| Sweden[bc g] | 30 933 | | | | | | 132 | | 40 427 | |
| Switzerland[bc] | 49 389 | 103 | 101 | 96 | 95 | 97 | 98 | 47 663 | 43 216 | 101 |
| United Kingdom | 778 058 | 100 | 97 | 93 | 92 | 91 | 94 | 706 775 | 728 117 | 103 |
| United States | 4 856 922 | 99 | 101 | 111 | 114 | 115 | 119 | 5 584 640 | 5 792 350 | 104 |

[a] Estimates for land-use change and forestry are as reported in accordance with the present IPCC Guidelines for National Greenhouse Gas Inventories (see table 7).

[b] As estimates for HFCs, PFCs and $SF_6$ were not provided, or not provided for all years, estimates given here are for $CO_2$, $CH_4$ and $N_2O$ only.

[c] As estimates for 1990-1995 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

[d] As estimates were not provided for land-use change and forestry, figures are not given in this table.

[e] As estimates for 1990-1994 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

[f] Estimates were only provided for 1990-1995.

[g] Estimates from land-use change and forestry were only available for 1990 and 1996.

**Table 3. Total anthropogenic $CO_2$ emissions, excluding land use change and forestry, 1990-1996 (Gigagrams and percentage change by Party)**

| | Percentage relative to 1990, 1990=100 | | | | | | | | | 1996 to 1995 percentage 1995=100 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1995 | 1996 | |
| | (Gg) | % | % | % | % | % | % | (Gg) | (Gg) | % |
| Australia | 275 344 | 101 | 102 | 103 | 104 | 108 | 112 | 298301 | 308 413 | 103 |
| Austria | 62 100 | 108 | 98 | 96 | 97 | 102 | 105 | 63 600 | 65 000 | 102 |
| Belgium | 116 090 | 103 | 102 | 100 | 104 | 105 | 111 | 121 832 | 128 546 | 106 |
| Canada | 460 899 | 98 | 101 | 101 | 103 | 107 | 110 | 494 970 | 508 574 | 103 |
| Czech Republic[a] | 165 490 | 93 | 85 | 81 | 77 | 78 | 80 | 128 817 | 132 538 | 103 |
| Denmark[a] | 52 277 | 120 | 110 | 114 | 121 | 114 | 140 | 59 532 | 73 236 | 123 |
| France | 390 708 | 107 | 105 | 99 | 99 | 101 | 104 | 393 419 | 406 666 | 103 |
| Germany | 1 014 155 | 96 | 91 | 91 | 89 | 88 | 90 | 894 500 | 910 000 | 102 |
| Greece | 85 349 | 100 | 102 | 102 | 104 | 106 | 108 | 90 306 | 91 978 | 102 |
| Ireland[b] | 30 719 | 103 | 105 | 104 | 108 | 111 | 113 | 34 116 | 34 819 | 102 |
| Japan | 1 124 532 | 102 | 103 | 102 | 108 | 109 | 110 | 1 220 218 | 1 234 904 | 101 |
| Latvia[a] | 24 771 | 78 | 66 | 58 | 48 | 49 | 45 | 12 027 | 11 065 | 92 |
| Monaco | 108 | 116 | 123 | 125 | 128 | 125 | 131 | 135 | 141 | 105 |
| Netherlands | 161 360 | 103 | 102 | 104 | 104 | 110 | 115 | 176 910 | 184 870 | 104 |
| New Zealand | 25 241 | 102 | 110 | 107 | 107 | 107 | 115 | 27 033 | 29 008 | 107 |
| Norway | 35 457 | 95 | 97 | 101 | 107 | 108 | 116 | 38 123 | 41 073 | 108 |
| Slovakia[b] | 60 032 | 88 | 81 | 77 | 72 | 76 | 77 | 45 360 | 46 105 | 102 |
| Sweden[a] | 55 445 | 100 | 101 | 101 | 106 | 105 | 114 | 58 108 | 63 350 | 109 |
| Switzerland[a] | 45 070 | 104 | 101 | 98 | 96 | 98 | 100 | 44 170 | 44 970 | 102 |
| United Kingdom | 583 165 | 101 | 98 | 95 | 95 | 93 | 97 | 543 753 | 563 450 | 104 |
| United States | 4 943 300 | 99 | 100 | 103 | 104 | 105 | 109 | 5 203 500 | 5 393 800 | 104 |

a As estimates for 1990-1995 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

b As estimates for 1990-1994 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

**Table 4. Total anthropogenic $CH_4$ emissions, 1990 - 1996 (Gigagrams and percentage change by Party)**

| | Percentage relative to 1990, 1990=100 | | | | | | | 1995 | 1996 | 1996 to 1995 percentage 1995=100 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1995 | 1996 | |
| | (Gg) | % | % | % | % | % | % | (Gg) | (Gg) | % |
| Australia | 5 345 | 100 | 99 | 99 | 98 | 99 | 99 | 5 292 | 5 308 | 100 |
| Austria | 587 | 98 | 98 | 98 | 99 | 98 | 98 | 578 | 574 | 99 |
| Belgium | 634 | 99 | 99 | 100 | 100 | 94 | 93 | 594 | 591 | 99 |
| Canada | 3 300 | 103 | 106 | 112 | 115 | 118 | 121 | 3 900 | 4 000 | 103 |
| Czech Republic[a] | 888 | 92 | 87 | 82 | 80 | 83 | 65 | 733 | 573 | 78 |
| Denmark[a] | 421 | 101 | 102 | 106 | 102 | 102 | 101 | 430 | 425 | 99 |
| France | 3 018 | 99 | 97 | 95 | 93 | 92 | 90 | 2 786 | 2 712 | 97 |
| Germany | 5 522 | 93 | 92 | 89 | 87 | 86 | 86 | 4 734 | 4 724 | 100 |
| Greece | 437 | 100 | 100 | 101 | 103 | 104 | 105 | 454 | 457 | 101 |
| Ireland[b] | 811 | 98 | 99 | 99 | 99 | 100 | 99 | 814 | 800 | 98 |
| Japan[c] | 1 549 | 99 | 98 | 97 | 97 | 96 | | 1 482 | | |
| Latvia[a] | 186 | 98 | 81 | 56 | 52 | 54 | 50 | 101 | 93 | 92 |
| Monaco[d] | ~0 | | | | | | | ~0 | ~0 | |
| Netherlands | 1 292 | 101 | 97 | 95 | 93 | 91 | 91 | 1 173 | 1 179 | 101 |
| New Zealand | 1 673 | 98 | 96 | 96 | 96 | 96 | 95 | 1 601 | 1 593 | 99 |
| Norway | 442 | 100 | 103 | 103 | 107 | 111 | 110 | 492 | 485 | 99 |
| Slovakia[b] | 409 | 93 | 88 | 81 | 77 | 76 | 77 | 310 | 314 | 101 |
| Sweden[a] | 324 | 99 | 99 | 99 | 94 | 91 | 92 | 296 | 297 | 100 |
| Switzerland[a] | 244 | 100 | 99 | 99 | 97 | 97 | 94 | 235 | 228 | 97 |
| United Kingdom | 4 438 | 99 | 98 | 90 | 85 | 85 | 84 | 3 751 | 3 712 | 99 |
| United States | 29 628 | 101 | 102 | 101 | 104 | 106 | 105 | 31 334 | 31 138 | 99 |

[a] As estimates for 1990-1995 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

[b] As estimates for 1990-1994 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

[c] Estimates were only provided for 1990-1995.

[d] The trend in emissions is not shown here as estimates reported were approximately zero (0.05-0.06 Gg, 1990 to 1996).

**Table 5. Total anthropogenic $N_2O$ emissions, 1990-1996 (Gigagrams and percentage change by Party)**

| | Percentage relative to 1990, 1990=100 | | | | | | | | | 1996 to 1995 percentage 1995=100 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1995 | 1996 | |
| | (Gg) | % | % | % | % | % | % | (Gg) | (Gg) | % |
| Australia | 74.9 | 101 | 101 | 103 | 103 | 106 | 105 | 79.4 | 78.9 | 99 |
| Austria | 9.2 | 103 | 103 | 105 | 108 | 109 | 109 | 10.0 | 10.0 | 100 |
| Belgium | 30.8 | 100 | 97 | 99 | 105 | 113 | 114 | 34.9 | 35.2 | 101 |
| Canada | 190.0 | 100 | 100 | 105 | 116 | 116 | 121 | 220.0 | 230.0 | 105 |
| Czech Republic[a] | 25.8 | 91 | 87 | 82 | 83 | 84 | 113 | 21.6 | 29.1 | 135 |
| Denmark[a] | 34.0 | 100 | 100 | 97 | 97 | 97 | 100 | 33.0 | 33.9 | 103 |
| France | 308.7 | 99 | 95 | 91 | 93 | 95 | 96 | 292.7 | 297.4 | 102 |
| Germany | 226.0 | 97 | 100 | 96 | 97 | 98 | 101 | 222.0 | 228.0 | 103 |
| Greece | 29.9 | 100 | 96 | 96 | 97 | 94 | 98 | 28.1 | 29.3 | 104 |
| Ireland[b] | 29.4 | 86 | 87 | 87 | 88 | 89 | 89 | 26.2 | 26.2 | 100 |
| Japan[c] | 61.0 | 96 | 96 | 99 | 100 | 103 | | 62.7 | | |
| Latvia[a] | 22.5 | 88 | 85 | 77 | 75 | 72 | 72 | 16.3 | 16.3 | 100 |
| Monaco[d] | ~0 | | | | | | | ~0 | ~0 | |
| Netherlands | 63.9 | 103 | 106 | 106 | 110 | 113 | 113 | 71.9 | 72.4 | 101 |
| New Zealand | 37.1 | 99 | 99 | 100 | 101 | 101 | 101 | 37.6 | 37.5 | 100 |
| Norway | 18.0 | 100 | 83 | 94 | 94 | 94 | 100 | 17.0 | 18.0 | 106 |
| Slovakia[b] | 12.5 | 87 | 72 | 57 | 58 | 61 | 63 | 7.6 | 7.9 | 104 |
| Sweden[a] | 9.2 | 100 | 96 | 100 | 103 | 100 | 110 | 9.2 | 10.1 | 110 |
| Switzerland[a] | 11.5 | 101 | 102 | 103 | 103 | 103 | 103 | 11.8 | 11.8 | 100 |
| United Kingdom | 215.0 | 97 | 86 | 81 | 88 | 85 | 88 | 183.3 | 189.3 | 103 |
| United States | 1 136.0 | 101 | 103 | 102 | 110 | 106 | 108 | 1 209.0 | 1 232.0 | 102 |

[a] As estimates for 1990-1995 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission due to factors such as the use of different methodologies or updated information.

[b] As estimates for 1990-1994 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

[c] Estimates were only provided for 1990-1995.

[d] The trend in emissions is not shown here as estimates reported were approximately zero (0.005-0.009 Gg, 1990 to 1996).

**Table 6. Emissions of hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride ($CO_2$ equivalent), 1990 and 1996[a] (Gigagrams and percentage change by Party)**

| | HFCs | | | PFCs | | | $SF_6$ | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 1996 | | 1990 | 1996 | | 1990 | 1996 | | 1990 | 1996 | |
| | Gg | Gg | % | Gg | Gg | % | Gg | Gg | % | Gg | Gg | % |
| Australia | | | | 4 860 | 1 484 | -69 | | 15 | | 4 860 | 1 499 | -69 |
| Austria[a] | | 712 | | | 68 | | | 789 | | | 1 568 | |
| Belgium | | 533 | | | 73 | | 333 | 333 | 0 | 333 | 939 | 182 |
| Canada | | 500 | | 6 000 | 6 000 | 0 | 3 000 | 1 000 | -67 | 9 000 | 7 500 | -17 |
| Czech Republic[a] | | 222 | | | 4 | | | 183 | | | 409 | |
| Denmark[a] | | 300 | | | 3 | | | 134 | | | 436 | |
| France | 2 250 | 2 325 | 3 | 2 602 | 1 261 | -52 | 2 414 | 2 701 | 12 | 7 266 | 6 287 | -13 |
| Germany[a] | 2 340 | 3 759 | 61 | 2 694 | 1 617 | -40 | 3 896 | 5 879 | 51 | 8 930 | 11 256 | 26 |
| Greece | 935 | 3 746 | 301 | 503 | 385 | -23 | | | | 1 438 | 4 131 | 187 |
| Ireland[b] | | | | | | | | | | | | |
| Japan[a] | 2 080 | 16 250 | 681 | 5 416 | 14 894 | 175 | 38 240 | 52 580 | 38 | 45 736 | 83 724 | 83 |
| Latvia[b] | | | | | | | | | | | | |
| Monaco[b] | | | | | | | | | | | | |
| Netherlands | 4 900 | 7 200 | 47 | 2 500 | 2 300 | -8 | 1 400 | 1 500 | 7 | 8 800 | 11 000 | 25 |
| New Zealand[a] | | 297 | | 519 | 237 | -54 | 25 | 25 | 0 | 544 | 560 | 3 |
| Norway | 0 | 268 | | 2 546 | 1 271 | -50 | 2 199 | 526 | -76 | 4 745 | 2 065 | -56 |
| Slovakia | | | | | 320 | | | | | | 320 | |
| Sweden[b] | | | | | | | | | | | | |
| Switzerland | | 413 | | | 24 | | | 72 | | | 508 | |
| United Kingdom[a] | 12 180 | 15 358 | 26 | 2 085 | 535 | -74 | 574 | 837 | 46 | 14 838 | 16 730 | 13 |
| United States[c] | 35 809 | 66 824 | 87 | 18 003 | 17 951 | 0 | 26 768 | 35 372 | 32 | 81 474 | 127 349 | 56 |

[a] The estimates provided in this table are in many cases approximate, as Parties provided emissions of HFCs and for PFCs on an aggregate basis and the secretariat had to make assumptions as to the species of the gases to calculate emissions in $CO_2$ equivalent. The secretariat based the estimates to the extent possible on information provided is previously submitted inventories.

[b] Estimates were not provided for these gases.

[c] The totals for the three separate gases do not equal the overall total owing to the inclusion of emissions from some sources that were not disaggregated to the three separate gases.

**Table 7. Anthropogenic $CO_2$ emissions and removals from land-use change and forestry, 1990-1996 (Gigagrams and percentage change by Party)[a]**

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | Percentage change in emissions or removals from 1990 to 1996 |
|---|---|---|---|---|---|---|---|---|
| | (Gg) | (Gg) | (Gg) | (Gg) | (Gg) | (Gg) | (Gg) | % |
| Australia | 58 873 | 50 752 | 46 980 | 44 672 | 38 161 | 37 144 | 36 260 | 38 |
| Austria | -13 300 | -15 300 | -17 900 | -17 800 | -14 700 | -13 600 | -13 800 | 4 |
| Belgium | -2 057 | -2 057 | -2 057 | -2 057 | -2 057 | -2 057 | -2 057 | 0 |
| Canada | -44 000 | -53 000 | -43 000 | -31 000 | -26 000 | -19 000 | -29 000 | -34 |
| Czech Republic[b] | -2 281 | -5 027 | -6 041 | -5 643 | -3 943 | -5 454 | -4 479 | 96 |
| Denmark[b] | -924 | -932 | -940 | -948 | -956 | -964 | -981 | 6 |
| France | -30 316 | -27 428 | -31 358 | -37 852 | -40 515 | -39 135 | -41 249 | 36 |
| Germany | -30 000 | -39 600 | -40 700 | -40 700 | -32 600 | -33 700 | -35 900 | 20 |
| Greece[c] | | | | | | | | |
| Ireland[d] | -5 160 | -5 390 | -5 580 | -5 760 | -5 970 | -6 230 | -6 497 | 26 |
| Japan[e] | -83 903 | -83 865 | -85 568 | -90 084 | -93 545 | -96 705 | | 15 |
| Latvia[b] | -10 826 | -14 186 | -14 235 | -14 228 | -14 206 | -10 484 | -14 320 | 32 |
| Monaco[c] | | | | | | | | |
| Netherlands | -1 500 | -1 600 | 1 600 | -1 600 | -1 700 | -1 700 | -1 700 | 13 |
| New Zealand | -21 313 | -20 199 | -18 541 | -16 940 | -16 404 | -16 468 | -16 530 | -22 |
| Norway | -9 590 | -11 700 | -13 250 | -13 510 | -15 680 | -13 640 | -17 611 | 84 |
| Slovakia[d] | -4 257 | -4 257 | -4 257 | -4 257 | -5 118 | -5 116 | -5 281 | 24 |
| Sweden[bf] | -34 368 | | | | | | -32 296 | -6 |
| Switzerland[b] | -4 360 | -4 380 | -4 430 | -5 160 | -5 150 | -5 100 | -5 200 | 19 |
| United Kingdom | 20 207 | 19 437 | 18 297 | 16 355 | 12 314 | 11 474 | 11 299 | 44 |
| United States | -1 142 200 | -1 142 200 | -1 142 200 | -764 700 | -764 700 | -764 700 | -764 683 | -33 |

a Estimates for land-use change and forestry are as reported in accordance with the present IPCC Guidelines for National Greenhouse Gas Inventories. In this table negative values in gigagrams indicate net removal of $CO_2$ from the land-use change and forestry category; negative values in percentage represent less removals in 1996 than in 1990 and positive values indicate more removals (or less emissions in the case of Australia and the United Kingdom) in 1996 than in 1990.

b As estimates for 1990-1995 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

c Estimates were not provided for land-use change and forestry.

d As estimates for 1990-1994 were not provided in the inventory submission, data from the second national communication are used in this table. However, the trend shown here may not be fully accurate as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

e Percentage change in removals are from 1990 to 1995.

f Estimates were only available for 1990 and 1996.

**Table 8. Anthropogenic $CO_2$ emissions by source category, excluding land-use change and forestry, 1990 and 1996 (Gigagrams and percentage of total by Party)**

| | Energy (excl transport) | | | | Transport | | | | Industrial processes | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | | 1996 | | 1990 | | 1996 | | 1990 | | 1996 | | 1990 | 1996 |
| | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | (Gg) |
| Australia | 209 093 | 75.9 | 234 050 | 75.9 | 59 596 | 21.6 | 67 240 | 21.8 | 6 655 | 2.4 | 7 110 | 2.3 | 275 344 | 308 413 |
| Austria | 34 900 | 56.2 | 37 800 | 58.2 | 13 900 | 22.4 | 15 700 | 24.2 | 12 700 | 20.5 | 10 900 | 16.8 | 62 100 | 65 000 |
| Belgium | 85 955 | 74.0 | 93 680 | 72.9 | 19 964 | 17.2 | 22 389 | 17.4 | 9 188 | 7.9 | 11 287 | 8.8 | 116 090 | 128 546 |
| Canada | 274 780 | 59.6 | 300 400 | 59.1 | 147 000 | 31.9 | 167 000 | 32.8 | 31 900 | 6.9 | 39 200 | 7.7 | 460 899 | 508 574 |
| Czech Republic[a] | 152 114 | 91.9 | 119 696 | 90.3 | 7 959 | 4.8 | 9 896 | 7.5 | 5 417 | 3.3 | 2 479 | 1.9 | 165 490 | 132 538 |
| Denmark[a] | 40 664 | 77.8 | 60 036 | 82.0 | 10 474 | 20.0 | 11 748 | 16.0 | 1 006 | 1.9 | 1 388 | 1.9 | 52 277 | 73 236 |
| France | 241 380 | 61.8 | 248 348 | 61.1 | 123 111 | 31.5 | 135 368 | 33.3 | 20 948 | 5.4 | 17 313 | 4.3 | 390 708 | 406 666 |
| Germany | 824 256 | 81.3 | 712 000 | 78.2 | 162 231 | 16.0 | 173 000 | 19.0 | 27 668 | 2.7 | 25 000 | 2.7 | 1 014 155 | 910 000 |
| Greece | 62 086 | 72.7 | 66 329 | 72.1 | 15 170 | 17.8 | 17 253 | 18.8 | 7 804 | 9.1 | 8 111 | 8.8 | 85 349 | 91 978 |
| Ireland[a] | 24 153 | 78.6 | 26 489 | 76.1 | 4 885 | 15.9 | 6 538 | 18.8 | 1 627 | 5.3 | 1 738 | 5.0 | 30 719 | 34 819 |
| Japan | 845 533 | 75.2 | 903 558 | 73.2 | 207 431 | 18.4 | 248 576 | 20.1 | 58 795 | 5.2 | 61 093 | 4.9 | 1 124 532 | 1 234 904 |
| Latvia[a] | 18 380 | 74.2 | 9 263 | 83.7 | 5 829 | 23.5 | 1 612 | 14.6 | 563 | 2.3 | 185 | 1.7 | 24 771 | 11 065 |
| Monaco | 67 | 61.6 | 91 | 64.4 | 39 | 36.5 | 47 | 33.1 | | | | | 108 | 141 |
| Netherlands | 129 390 | 80.2 | 148 500 | 80.3 | 28 560 | 17.7 | 33 370 | 18.1 | 1 880 | 1.2 | 1 740 | 0.9 | 161 360 | 184 870 |
| New Zealand | 14 210 | 56.3 | 15 294 | 52.7 | 8 645 | 34.2 | 10 972 | 37.8 | 2 386 | 9.5 | 2 742 | 9.5 | 25 241 | 29 008 |
| Norway | 14 723 | 41.5 | 18 254 | 44.4 | 13 885 | 39.2 | 15 508 | 37.8 | 6 694 | 18.9 | 7 163 | 17.4 | 35 457 | 41 073 |
| Slovakia[a] | 51 417 | 85.6 | 38 940 | 84.5 | 5 168 | 8.6 | 4 164 | 9.0 | 3 447 | 5.7 | 3 001 | 6.5 | 60 032 | 46 105 |
| Sweden[a] | 32 732 | 59.0 | 39 817 | 62.9 | 18 650 | 33.6 | 19 573 | 30.9 | 3 787 | 6.8 | 3 711 | 5.9 | 55 445 | 63 350 |
| Switzerland[a] | 25 718 | 57.1 | 26 460 | 58.8 | 14 668 | 32.5 | 14 910 | 33.2 | 3 363 | 7.5 | 2 200 | 4 9 | 45 070 | 44 970 |
| United Kingdom | 452 689 | 77.6 | 429 486 | 76.2 | 115 901 | 19.9 | 121 882 | 21.6 | 13 916 | 2.4 | 11 703 | 2.1 | 583 165 | 563 450 |
| United States | 3 389 700 | 68.6 | 3 699 483 | 68.6 | 1 499 100 | 30.3 | 1 631 090 | 30.2 | 54 500 | 1.1 | 63 309 | 1.2 | 4 943 300 | 5 393 883 |

[a] As estimates for 1990 were not provided in the inventory submission, data from the second national communication are used in this table. However, the comparison of 1990 and 1996 data may not be fully consistent as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

**Table 9. Anthropogenic $CH_4$ emissions by source category, 1990 and 1996 (Gigagrams and percentage of total by Party)**

| | Fugitive fuel | | | | Agriculture | | | | Waste | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | | 1996 | | 1990 | | 1996 | | 1990 | | 1996 | | 1990 | 1996 |
| | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | (Gg) |
| Australia | 1 108 | 20.7 | 1 143 | 21.5 | 3 200 | 59.9 | 3 096 | 58.3 | 704 | 13.2 | 794 | 15 | 5 345 | 5 308 |
| Austria | 4 | 0.7 | 6 | 1 | 208 | 35.5 | 207 | 36 | 227 | 38.7 | 218 | 38 | 587 | 574 |
| Belgium | 53 | 8.4 | 34 | 5.7 | 388 | 61.2 | 354 | 60 | 174 | 27.4 | 186 | 31.5 | 634 | 591 |
| Canada | 1 200 | 36.4 | 1 700 | 42.5 | 950 | 28.8 | 1 100 | 27.5 | 850 | 25.8 | 940 | 23.5 | 3 300 | 4 000 |
| Czech Republic[a] | 460 | 51.8 | 301 | 52.5 | 204 | 23 | 134 | 23.4 | 149 | 16.7 | 97 | 17 | 888 | 573 |
| Denmark[a] | 12 | 2.9 | 17 | 4.1 | 329 | 78.1 | 321 | 75.5 | 71 | 16.9 | 73 | 17.2 | 421 | 425 |
| France | 311 | 10.3 | 263 | 9.7 | 1 630 | 54 | 1 565 | 57.7 | 815 | 27 | 607 | 22.4 | 3018 | 2 712 |
| Germany | 1 560 | 28.3 | 1 155 | 24.4 | 1 887 | 34.2 | 1 547 | 32.7 | 1 870 | 33.9 | 1 900 | 40.2 | 5522 | 4 724 |
| Greece | 44 | 10.1 | 51 | 11.1 | 271 | 61.9 | 280 | 61.2 | 109 | 24.9 | 113 | 24.6 | 437 | 457 |
| Ireland[a] | 10 | 1.3 | 12 | 1.5 | 640 | 78.9 | 655 | 81.9 | 136 | 16.8 | 102 | 12.8 | 811 | 800 |
| Japan | 166 | 10.7 | | | 842 | 54.4 | | | 394 | 25.4 | | | 1 549 | |
| Latvia[a] | 53 | 28.6 | 19 | 20.2 | 111 | 59.7 | 42 | 45 | 19 | 10.4 | 26 | 28.1 | 186 | 93 |
| Monaco[b] | | | | | | | | | ~0 | 44.2 | ~0 | 38.3 | ~0 | ~0 |
| Netherlands | 179 | 13.8 | 192 | 16.3 | 505 | 39.1 | 476 | 40.4 | 568 | 44 | 466 | 39.5 | 1 292 | 1 179 |
| New Zealand | 25 | 1.5 | 31 | 2 | 1 492 | 89.2 | 1 431 | 89.8 | 141 | 8.4 | 114 | 7.2 | 1 673 | 1 593 |
| Norway | 20 | 4.5 | 27 | 5.6 | 102 | 23.1 | 109 | 22.5 | 302 | 68.3 | 327 | 67.4 | 442 | 485 |
| Slovakia[a] | 122 | 29.8 | 119 | 37.9 | 187 | 45.7 | 109 | 34.7 | 65 | 15.9 | 69 | 22 | 409 | 314 |
| Sweden[a] | | | | | 200 | 61.7 | 198 | 66.7 | 85 | 26.2 | 61 | 20.5 | 324 | 297 |
| Switzerland[a] | 15 | 6 | 13 | 5.6 | 151 | 62 | 142 | 62.4 | 69 | 28.2 | 66 | 28.7 | 244 | 228 |
| United Kingdom | 1 319 | 29.7 | 800 | 21.6 | 1 090 | 24.6 | 1 064 | 28.7 | 1 923 | 43.3 | 1 754 | 47.3 | 4 438 | 3 712 |
| United States | 10 172 | 34.3 | 9 471 | 30.4 | 8 700 | 29.4 | 9 300 | 29.9 | 10 000 | 33.8 | 11 600 | 37.3 | 29 628 | 31 138 |

[a] As estimates for 1990 were not provided in the inventory submission, data from the second national communication are used in this table. However, the comparison of 1990 and 1996 data may not be fully consistent as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

[b] Estimates reported were approximately zero (total 1990 and 1996, 0.05 and 0.06 Gg).

**Table 10. Anthropogenic $N_2O$ emissions by source category, 1990 and 1996 (Gigagrams and percentage of total by Party)**

| | Energy | | | | Industrial processes | | | | Agriculture | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | | 1996 | | 1990 | | 1996 | | 1990 | | 1996 | | 1990 | 1996 |
| | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | % | (Gg) | (Gg) |
| Australia | 7.8 | 10.5 | 13.5 | 17.1 | 1.6 | 2.2 | 1.6 | 2.0 | 63.0 | 84.1 | 62.0 | 78.6 | 74.9 | 78.9 |
| Austria | 1.9 | 20.7 | 2.8 | 28.0 | 0.6 | 6.5 | 0.5 | 5.0 | 3.3 | 35.9 | 3.3 | 33.0 | 9.2 | 10.0 |
| Belgium | 8.3 | 26.9 | 8.6 | 24.4 | 11.5 | 37.3 | 14.0 | 39.9 | 10.9 | 35.4 | 9.8 | 27.9 | 30.8 | 35.2 |
| Canada | 37.0 | 19.5 | 59.0 | 25.7 | 37.0 | 19.5 | 40.0 | 17.4 | 110.0 | 57.9 | 130.0 | 56.5 | 190.0 | 230.0 |
| Czech Republic[a] | 20.0 | 77.5 | 4.2 | 14.3 | 3.3 | 12.8 | 3.3 | 11.5 | 2.3 | 8.9 | 20.6 | 70.8 | 25.8 | 29.1 |
| Denmark[a] | 2.0 | 5.9 | 3.1 | 9.0 | | | | | 33.0 | 97.1 | 30.2 | 89.1 | 34.0 | 33.9 |
| France | 14.9 | 4.8 | 19.3 | 6.5 | 90.0 | 29.2 | 81.1 | 27.2 | 181.1 | 58.7 | 173.7 | 58.4 | 308.7 | 297.4 |
| Germany | 37.0 | 16.4 | 46.0 | 20.2 | 83.0 | 36.7 | 87.0 | 38.2 | 96.0 | 42.5 | 85.0 | 37.3 | 226.0 | 228.0 |
| Greece | 6.7 | 22.4 | 7.8 | 26.6 | 2.3 | 7.7 | 1.8 | 6.1 | 20.6 | 68.9 | 19.5 | 66.6 | 29.9 | 29.3 |
| Ireland[a] | 2.8 | 9.4 | 3.7 | 14.0 | 2.6 | 8.9 | 2.6 | 10.0 | 23.3 | 79.5 | 19.0 | 72.6 | 29.4 | 26.2 |
| Japan | 22.1 | 36.2 | | | 23.8 | 39.0 | | | 9.3 | 15.2 | | | 61.0 | |
| Latvia[a] | 0.3 | 1.2 | 0.4 | 2.3 | | | | | 22.0 | 97.6 | 15.6 | 96.1 | 22.5 | 16.3 |
| Monaco[b] | ~0 | 60.0 | ~0 | 66.7 | | | | | | | | | ~0 | ~0 |
| Netherlands | 5.3 | 8.3 | 8.5 | 11.7 | 31.5 | 49.3 | 31.6 | 43.6 | 22.2 | 34.7 | 27.5 | 38.0 | 63.9 | 72.4 |
| New Zealand | 0.6 | 1.6 | 0.7 | 1.9 | | | | | 36.3 | 97.7 | 36.5 | 97.4 | 37.1 | 37.5 |
| Norway | 2.0 | 11.1 | 3.0 | 16.7 | 7.0 | 38.9 | 5.0 | 27.8 | 9.0 | 50.0 | 9.0 | 50.0 | 18.0 | 18.0 |
| Slovakia[a] | 0.6 | 4.8 | 0.9 | 11.4 | 2.1 | 16.8 | 1.1 | 13.9 | 9.5 | 76.0 | 5.5 | 69.6 | 12.5 | 7.9 |
| Sweden[a] | 6.3 | 68.5 | 7.1 | 70.3 | 2.7 | 29.3 | 2.8 | 27.7 | 0.2 | 2.2 | 0.2 | 2.0 | 9.2 | 10.1 |
| Switzerland[a] | 1.4 | 12.1 | 2.1 | 17.8 | 0.3 | 2.8 | 0.3 | 2.6 | 9.2 | 80.1 | 8.7 | 73.7 | 11.5 | 11.8 |
| United Kingdom | 15.5 | 7.2 | 20.5 | 10.8 | 95.3 | 44.3 | 70.3 | 37.1 | 103.8 | 48.3 | 98.3 | 51.9 | 215.0 | 189.3 |
| United States | 244.0 | 21.5 | 248.0 | 20.1 | 96.0 | 8.5 | 108.0 | 8.8 | 770.0 | 67.8 | 848.0 | 68.8 | 1 136.0 | 1 232.0 |

[a] As estimates for 1990 were not provided in the inventory submission, data from the second national communication are used in this table. However, the comparison of 1990 and 1996 data may not be fully consistent as the data from the national communication may not be consistent with data in the inventory submission because of factors such as the use of different methodologies or updated information.

[b] Estimates reported were approximately zero (total 1990 and 1996, 0.005 and 0.009 Gg).

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